

**AMENDMENTS TO THE CLAIMS**

This listing of the claims replaces all prior listings and versions:

1. (currently amended): A biodetector for the detection of a selected substance comprising:
  - (a) a signal converting element, comprising an extracellular ligand-specific moiety and an intracellular signal transforming domain, wherein said extracellular ligand-specific moiety selectively recognizes said selected substance, which recognition activates said intracellular transforming domain;
  - (b) a transducer, wherein said transducer has an inactive form and an active form which are distinct from each other, and said activated intracellular signal transforming domain converts said inactive form of said transducer into said active form of said transducer;
  - (c) a responsive element comprising a transcription activation element, wherein said responsive element is activated by said active form of said transducer, resulting in a detectable signal.
2. (canceled).
3. (currently amended): The biodetector of claim 1 2, wherein said responsive element further comprises a nucleic acid encoding one or a plurality of gene products, which gene product or gene products produce said detectable signal, and wherein said nucleic acid is operatively linked to said transcription activation element.
4. (previously presented): The biodetector of claim 3, wherein the detectable signal is light.
5. (previously presented): The biodetector of claim 3, wherein said gene produce is detectable by means selected from the group consisting of bioluminescence, colorimetric reactions or fluorescence.
6. (previously presented): The biodetector of claim 3, wherein said nucleic acid comprises a luciferase operon.

7. (previously presented): The biodetector of claim 1, wherein said intracellular signal transforming domain is a membrane signal transducer.

8. (previously presented): The biodetector of claim 7, wherein the membrane signal transducer is selected from the group consisting of bacterial two-component regulatory systems, eukaryotic receptor-mediated signal transducers, and prokaryotic receptor-mediated signal transducers.

9. (previously presented): The biodetector of claim 6, wherein said substance is selected from the group consisting of microorganism, virus, retrovirus, protein, sugar and ion.

10 to 20. (canceled).

21. (previously presented): The biodetector of claim 1, wherein said signal transforming domain is derived from PhoQ.

22. (previously presented): A genetically engineered bacterial cell comprising a biodetector according to claim 1.

23. (previously presented): The biodetector of claim 1, wherein said signal converting element is a transmembrane fusion protein comprising an extracellular ligand-specific moiety and an intracellular enzymatic signal transforming domain.

24. (previously presented): The biodetector of claim 23, wherein said extracellular ligand-specific moiety is derived from an antibody.

25. (previously presented): The biodetector of claim 23, wherein said enzyme signal transforming domain comprises an active domain of PhoQ.

26. (previously presented): The biodetector of claim 23, wherein said fusion protein is a fusion of an active domain of PhoQ, and a region of a heavy chain antibody.

27. (previously presented): The biodetector of claim 5, wherein said gene product is detectable by means of bioluminescence.